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ABSTRACT

This monograph describes four experiments in which two signaling techniques were used by students. Three kinds of accuracy and the conditions under which they occured were looked at. Each experiment was designed to require students to engage successively in two or three journalistic tasks (e.g., writing a news story, judging news values, and planning illustrations). The three different kinds of accuracy measured were: a "source oriented concept," in which an outside observer judges the accuracy of a message extracted from a receiver; an "observer's concept of message accuracy," in which an outside source evaluates content accuracy of a message; and an "observer's concept of 'meaning' accuracy," in which understanding is evaluated separately from message content. The document concludes with a discussion of the potential of these operational concepts of accuracy for further investigation of communication activities. (RB)

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BETH HEFFNER

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BETH HEFFNER

Communicatory Accuracy: Four Experiments

BETH HEFFNER was awarded a Ph.D. in communications by the University of Washington in 1972 and now resides in Unionville, Pennsylvania. She expresses her thanks to two University of Washington faculty members, Prof. Richard F. Carter, who devised the observational methods used in the experiments reported here, and Prof. Merrill Samuelson, who gathered the data for one of the experiments. Both also criticized the manuscript.

Contents

Introduction

In what ways can communication be said to be "accurate"? The word is heard not only in connection with "responsible" journalism, but with "good" communication in general, raising the possibility that it may be just another slogan that does not refer to anything in particular. There do seem to be quite a few different concepts of accuracy in communication, ranging from the precise (signal fidelity) to the somewhat mystical ("getting across the right idea"). It is intended here to review several of these concepts of accuracy and then describe some new ways in which they have been measured.

Some Concepts of Accuracy in Communication Studies

Any concept of accuracy implies a comparison of something with something else. But a comparison requires, in addition to the objects to be compared, someone to do the comparing. The two questions of what are being compared and who is comparing are not independent, because often an answer to one places limits on what the answer to the other can be. That is, the standpoint from which a comparison is made may circumscribe what *can* be compared, or conversely, the things to be compared may determine whose standpoint *must* be taken.

However, it is possible to discuss these two questions separately, and it may be helpful to do so. Both communication theorists and communication researchers have worked with concepts of accuracy, and their differences seem due largely to the "point of view" aspect, i.e., who does the comparing. For this reason, the question of "accuracy according to whom" will be covered first, and then the question of "accuracy of what?"

For many communication situations there are three possible standpoints from which accuracy can be looked for, 1) an observer looking at participants, 2) the source of a "message"[1] or 3) a receiver of a message. Different notions of accuracy result, depending on whose point of view is taken.

[1] As used here, "message" refers to the physical, time-and-space variety.

Observer's Concepts of Accuracy—Theory-oriented writers on accuracy tend to take an observer's standpoint. In particular, information "theory," which is the prototype for many dyadic communication paradigms, includes an observer's concept of accuracy.[2] For writers in the tradition of information theory, accuracy is a function of the number of "errors" detected in a set of signals checked at different times, particularly before and after the signals have gone through some channel. If the observer finds different signals at later points in time from those looked at earlier, then the channel is said to have less than perfect "fidelity." (Accuracy tends to be used in a situational sense, in connection with particular messages, while fidelity and "stability"[3] are cross-situational terms referring to channel characteristics.) Error is supposed to be prevented by such techniques as reducing "noise" (extraneous signals that may drown out pertinent ones), increasing "redundancy" (repetition of pertinent signals), and using high-fidelity channels. In information theory, then, accuracy or the lack of it is determined by observing messages.

Another kind of observer's concept of accuracy requires the observer to look inside the communicating participants rather than at messages. For example, Mehrabian and Reed, in theorizing about "determinants of communication accuracy," define it as "the degree of correspondence" between "referents decoded" and "referents encoded" by, respectively, a receiver and an originator of a message.[4] In other words, one attempts to observe the extent to which the originator and receiver of a message think it says the "same" thing.

Also an observer's construct, but still further removed from messages, is a concept of accuracy suggested by Chaffee and McLeod:[5] One observes whether a participant's estimate of the

[2] Claude E. Shannon and Warren Weaver, *The Mathematical Theory of Communication* (Urbana: University of Illinois, 1949).

[3] Wilbur Schramm, "Information Theory and Mass Communication," *Journalism Quarterly*, Vol. 32 (1955), pp. 131-46.

[4] Albert Mehrabian and Henry Reed, "Some Determinants of Communication Accuracy," *Psychological Bulletin*, Vol. 70 (1968), pp. 365-81.

[5] Steven H. Chaffee and Jack M. McLeod, "Sensitization in Panel Design: A Coorientational Experiment," *Journalism Quarterly*, Vol. 45 (1968), pp. 661-69.

other's "cognitions" resembles what the other "really does think." (Chaffee and McLeod distinguish their concept of accuracy from what they call agreement, which refers to similarity of evaluations between two persons, and from what they call perceived congruency, in which a person thinks the other's evaluations are similar to his.) It has been suggested that this notion of accuracy might be a good criterion for the "information exchange function" of dyadic communication.[6] That is, each participant would seem more likely to be able to guess correctly what the other thinks *after* communication than before. This would not necessarily hold for agreement or congruency.

Source-Oriented Concepts of Accuracy—Contrasting with the above theoretical conceptions of accuracy, in which an outside observer compares states of affairs between messages or between participants, there is a research procedure that attempts to put a source in this capacity. After message transmission, something is extracted from a receiver and given to the source, who judges its correctness. This is a popular procedure, particularly in research on mediated communication. For example, Charnley started a series of newspaper accuracy surveys in which the original sources of news story information were asked whether the stories contained errors.[7] Tichenor, *et al.* expanded on this by getting audience statements about the content of news stories, and asking the original sources whether the statements contained errors.[8]

Similar research procedures have been followed in studies of rumor transmission, in serial reproduction experiments, in feedback and redundancy studies, and in studies of the communication of emotions. But while the research procedure seems fairly well defined, it has to be asked whether there is any more to the source-oriented notions of accuracy than an operational definition. Although the operation of getting something from a receiver

[6] Daniel Wackman, "Interpersonal Communication and Coorientation," paper presented to the Association for Education in Journalism, Columbia, S.C., 1971.

[7] Mitchell V. Charnley, "Preliminary Notes on a Study of Newspaper Accuracy," *Journalism Quarterly*, Vol. 13 (1936), pp. 394-401.

[8] Phillip J. Tichenor, Clarice N. Olien, Annette Harrison and George Donohue, "Mass Communication Systems and Communication Accuracy in Science News Reporting," *Journalism Quarterly*, Vol. 47 (1970), pp. 673-83.

and showing it to a source is easily performed, it is not very clear what is being operationalized. Accuracy is simply what the source says it is.

Also, when accuracy is defined from a source's standpoint, a question always comes up as to whether the criterion for accuracy is "subjective" or "objective,"[9] i.e., whether accuracy *could* have been determined using some standard other than the source's. Objective errors are viewed as those that could be verified impersonally; subjective errors are those of misemphasis or distortion of "meaning" that depend on the source's opinion. For example, news sources may complain that, although certain facts are correct, their "intention" has not been reported faithfully.

Receiver-Oriented Concepts of Accuracy—As an alternative to asking sources about responses of receivers, receivers themselves can be employed in judging accuracy. One way of treating accuracy as a receiver's concept can be derived from a formulation by Pearce and Stamm,[10] who attempt to make accuracy a "process," or actor's, term rather than a "static," or observer's, term. For Pearce and Stamm, accuracy involves "the sequential relation of two sets of discriminations. In this sequence the individual discriminates the relation between his view and that of the other actor's, and invokes his expectancy of what the relation should be." The former discrimination "may result from information exchange in ongoing communication;" while the latter, the expectancy, "is a learned discrimination which may be a result of previous interaction (or perhaps an inference that 'p_2 is a person like me')." This reconceptualization, Pearce and Stamm say, "views accuracy as part of the communication process descriptive of the actors' cognitive behavior over time."

An example may make this more clear: In the Pearce and Stamm view, a person communicating with another may receive something that does not go along with *any* of his expectations, i.e., hypotheses as to the entire range of possibilities for what the other person could have said. For the receiver, this would be inaccuracy (not

[9] Gary C. Lawrence and David L. Grey, "Subjective Inaccuracies in Local News Reporting," *Journalism Quarterly*, Vol. 46 (1969), pp. 753-57.

[10] W. Barnett Pearce and Keith R. Stamm, "Coorientational States as Antecedents to Communication Behavior: A Process Model of Person Object and Person-Person Relations," paper presented to the Association for Education in Journalism, Columbia, S.C., 1971.

incredulity or surprise which, when applicable, would be in addition to inaccuracy).

There is another way to consider the possibility of accuracy as a receiver's concept—Ask what a receiver is referring to when saying "I understand" or "I see what you mean." Somewhat surprisingly, in Skinner's behavioristic formulation,[11] this approach implicitly is taken in treating the difference between *I understand*[12] and other "autoclitic" expressions such as *I agree* or *I know*. Skinner says that expressions like *I understand* and *I see* describe the "strength" within the receiver of a "verbal response" made by a speaker, "with respect to the sources of that strength." The exact conditions under which a person says he understands are "not easily specified," Skinner says: however, "*I understand* is not merely a description of strength such as *I am sure* and *I know*, nor is it a matter of correspondence with the behavior of the speaker, as *I agree*." What is called for, says Skinner, is "a subtle distinction among the variables responsible for the listener's own behavior. He can say *I understand* only after he has identified the variables which were mainly effective in leading him to make [this] response." In particular, Skinner says, the listener "must be sure he has not 'understood' because of spurious techniques of rhetoric or style which have built predispositions to respond through irrelevant devices."

However, Skinner also notes in passing that *I understand* may be used in a more elementary sense, having to do with language usage: "In a trivial sense 'to understand' is to be *able* to say the same thing . . . This is probably something more than a purely echoic response . . . The listener probably says *I understand* only when he can emit corresponding behavior . . ."

Additionally, Skinner tells how he as an observer views understanding: "The listener can be said to understand a speaker if he simply behaves in an appropriate fashion . . . He understands to the extent that his future behavior shows an appropriate change."

[11] B. F. Skinner, *Verbal Behavior* (New York: Appleton-Century-Crofts, 1957).

[12] The italics are in line with Skinner's convention for showing the names of verbal responses. He does not use quotation marks because they imply responses themselves rather than just names. Verbal behavior, he says, differs from other behavior in that responses and their names often are similar in form.

In short, although Skinner does not ordinarily deal at length with terms like understanding, he seems to recognize that it is an important one, and that it is not a single concept.

Although receiver-oriented concepts of accuracy may seem more difficult to work with than either observers' or sources' concepts, they could turn out to be very useful when definitional issues are cleared up (such as specification of the variables Skinner refers to).

Accuracy of What?—It was mentioned earlier that there is a necessary relationship between *a*) who determines accuracy, and *b*) the elements accuracy is determined from, i.e., what are compared. This relationship concerns the constraint of having to look at message content in making the comparison: While an outside observer is not limited to looking at message content, either a source or a receiver is so limited. Although an outside observer *can* look at messages, as in the information-theory concept of accuracy, he does not *have* to. Both sources and receivers do have to, given their restricted viewpoints. In any accuracy judgment made by a source or a receiver, at least one element of the comparison must be message content. A source's notion of accuracy is that he is not gainsaid by future message content from a receiver; a receiver's idea of accuracy is that the message he is given reinforces earlier message content, or does not contradict what he has already learned.

Of course the reason for this constraint on sources and receivers stems from the fact that neither has access to what goes on in the other's head. To use a cliche, their communication problem is also an observation problem. It is an insoluble problem as well, since lack of access to the other is an inherent aspect of either a source's or a receiver's standpoint.

On the other hand, if accuracy is looked for by a non-participant observer (assuming that this observer has ways of getting beyond messages), then *message content need not be included in the concept of accuracy used.* Because the most important aspects of communication seem to be located inside persons rather than in messages,[13] the observer's standpoint then provides quite an advantage. This is taken up again later, in describing an experiment designed for an observer's concept of accuracy.

[13] Lee Thayer, *Communication and Communication Systems* (Homewood, Illinois: Richard D. Irwin, Inc., 1968), pp. 26-28.

There is, however, a characteristic disadvantage in the outside observer's standpoint. Although the litany calls for regarding communication as "a process," it is not feasible for outside observers to observe processes. Most kinds of observation involve measurements made at particular points in time, so for all practical purposes the only things that can be observed are states and static relations. It follows that any units of analysis (what researchers look at), for accuracy or any other aspect of communication, must be states or static relations.

Units of Analysis

Some of the recent work by Carter is directed toward defining communication states that would be useful units of analysis.[14] Carter says it is futile anyway to go on viewing communication as "process." He apparently finds unproductive such statements as "Communication is a process that can include encoding, transmission, exposure, decoding, feedback, . . ." One drawback to such views of communication, he says, is that they include a lot that is *not* process. That is, activities (encoding, attention, etc.) are identified with respect to *content*. The activity of selective exposure, for example, is *to* certain content; the activity of decoding is *of* content, and so on. Carter proposes a unit of analysis that is content-free; he calls for observing communicative acts apart from communicative content.

Carter suggests, then, that new and different things be looked at in communication studies and his formulation specifies how they may be found.

He proposes two kinds of content-free units. First, he recommends that activity concepts (decoding, feedback, etc.) be replaced with state concepts, where replacement is more than just redefinition. This must be done, he says, not just because activities are not static, but because they are not delimited enough, i.e., "When the communicatory activity is examined, part of it turns

[14] Richard F. Carter, "Theoretical Development in the Use of Signaled Stopping," paper presented to the Association for Education in Journalism, Columbia, S.C., 1971. This is a comprehensive account, but see also Carter's "Research on Stopping," paper presented to the Pacific chapter of the American Association for Public Opinion Research, San Diego, 1970; and "Eureka Holding Company," unpublished paper, University of Washington School of Communications.

out to be something else, such as a communicative act with political content . . ." The conceptual replacement requires separating each communicatory activity into two parts, one of which is an *act*. This act serves as a "vehicle" for carrying the other part of the activity, its *content*. Any communicatory activity—information seeking, for example—consists of *a*) an act (e.g., a set of sounds), plus *b*) content (e.g., a question), where the act is one communication state and the content is another.

The other content-free unit in Carter's proposal is another kind of act. Between any pair of activities (where each activity consists of an act plus content) is another act state that is *not* a vehicle for content. Carter calls this act state a *stop*. It is assumed that a person (or a collective entity, to which Carter's formulation applies equally well) can engage in no more than one activity at a time. For example, a person cannot simultaneously both talk to and listen to another. Hence it is necessary to stop one activity before starting a different activity. A stop is content-free; it is simply a cessation of movement, a suspension of the preceding activity.

Activities, Act States and Content States—To those not used to Carter's terminology the foregoing discussion of acts and activities may seem to harbor a distinction without a difference. The difference can be schematized as follows, where the top line represents the "activity," or "process," view of communication and the bottom lines represent Carter's view. In the former version (top line), switching from one activity to another is itself regarded as another activity; while for Carter (bottom lines) the states corresponding to activities are separated by stops, which are act states that have no content.

..... Switch	Activity	..... Switch	Activity	..... Switch ....
Act	Act + Content	Act	Act + Content	Act
(Stop)(Vehicle)		*(Stop)(Vehicle)*		*(Stop)*

Carter gives a very practical reason for separating acts from content. It has to do with what he calls *intervention*, the effecting of change. A major goal if not the *raison d'etre* of science is to develop capabilities for intervention. For Carter, finding *conditions* for intervention depends on locating content-free acts. Identifying when a person does anything at all should precede identifying when a person does something in particular. Carter

says that if activity concepts are retained, the more useful (for intervention) act units will continue to be overlooked in favor of the less useful content units.

Measuring Operations for Locating Units of Analysis—To operationalize the communicative act of stopping, it is necessary to have persons show when they want to "suspend time and space," by providing a way for them to "control temporal relevance." Carter suggests two operational definitions of stopping that apply to *receivers* of messages. The one we are concerned with here is straightforward: Persons whose stops are to be observed simply show, using a signaling technique, any *interruptions* they want to make while receiving a message. Whenever they want to interrupt an incoming message (and so that they can afford to stop for any reason), they give a signal. For aural messages this signal could be the raising of one's hand, as in a classroom situation, or the use of the stop button on a tape recorder. For printed messages, this signal could be the making of a mark, such as a slash, in the message.

Interruptions, then, provide a *trace* of stopping on the part of receivers of messages. There is a fine point concerning this operationalization: Carter says, "It may seem anomalous that an activity, interrupting, is our "measure" of an act state whose distinction from a content state derives from dividing up activity concepts. An analogy may help. In a cloud chamber, the resultant trace is used to indicate the presence of some atomic condition . . . [So] as long as we assign no other significance to the interrupting activity, there is no conceptual difficulty. What it amounts to is saying that the interruption constitutes a signal but not a symbol." In other words, an interruption does not "mean" anything other than the trace of a stop. Unlike other activities, it is not attached to some particular content. All an interruption means is that *something* has significance *now* for the receiver of a message.

Persons using Carter's signaling technique can interrupt anywhere at any time. The only instruction they are given is some variant of, "If and when you come to a place where you want to stop, give this signal." Because signaled stops are not restricted to occurring at any particular time, such as at sentence endings, they provide units of analysis that do not reflect observer intrusion of units. In effect, the person being observed determines what the

units of analysis will be. A signaled stop shows where something has "relevance" for the person observed, so that the person observing can either compare it with his own units or use it in constructing other units.

The relationship between observers and what they observe presents a number of difficulties for communication research, and signaling techniques help to overcome one of them—that what constitutes a unit from an observer's standpoint may be artificial from an actor's standpoint. In a broader sense, this philosophical problem pervades all science, social or otherwise;[15] and in particular it harks back to the earlier discussion of accuracy. A participant and an outside observer each can discern things that the other cannot. The usual solution is simply to take one or the other standpoint, and not both. For example, linguists have observed verbal behavior using such units as phonemes and morphemes, which are observer's constructs, without attempting descriptions that are "real" for the actors.[16]

In looking at communication, Carter handles the observer-observed problem somewhat differently. He really does not exclude either the actor's or the observer's standpoint. In his formulation, although units are specified initially by actors, their units can then be used by observers in creating other units. The latter might exist only for observers.

There is, however, another difficulty involving the observer-observed relationship that the use of signaling techniques introduces rather than solves. Although a person may stop naturally, recurrently and necessarily, procedures such as that of interrupting, of *showing* one's stops, are not "natural." One reason they are not natural derives from socialization, during which persons learn, for example, that interrupting is bad form. It is impolite not to let the other person finish. Along with common courtesies, persons also learn certain benefits of delaying interruptions—that what comes later may obviate one's present reason for stopping. In short, even though interruptions reflect a person's relevances, the procedure for interrupting itself may not always be "relevant."

[15] Floyd H. Allport, "Logical Complexities of Group Activity," in David Braybrooke (ed.), *Philosophical Problems of the Social Sciences* (New York: Macmillan, 1965), p. 29.

[16] B. F. Skinner, *op. cit.*

Carter admits that having persons show their stops may be intrusive at first. However, he says with practice they could learn to use signaling techniques in the manner of "functional inattention" much as they would use keys on a typewriter. He also points out that any intrusive aspects are best determined empirically. If research operations are replicated with and without use of a signaling technique, the latter's intrusive effects can be assessed simply by comparison.

The idea of signaling is quite general, and signaling techniques other than that of interrupting can be used within Carter's methodology. For one thing, signaling techniques can be used by creators of messages as well as by those receiving them. Such techniques already are used to some extent, as in punctuation ("STOP," "OVER," etc.). In particular, either a creator or a receiver of a message could give a signal (to an observer) that says, in effect, "This completes a unit." A technique for showing unit boundaries rather than interruptions was used in one of the experiments reported here.

Units of Observation for Concepts of Accuracy

In the four experiments about to be described, two signaling techniques were used by students. Three kinds of accuracy and the conditions under which they occurred were looked at.

The experiments had similar designs with regard to communicatory activities. They each required students to engage successively in two or three journalistic tasks (e.g., writing a news story, judging news values, planning illustrations). The paradigm was mediated communication in the manner of Westley and MacLean,[17] in that stories were written from source material and then given to an audience. The mediated communication framework was adopted because it includes explicit information to be "communicated" (the source material), which was necessary for some of the concepts of accuracy involved.

In three of the experiments, students created messages on one topic and received messages on another topic. Experiment 4, however, was designed for each successive task to be done by a different group of students.

[17] Bruce H. Westley and Malcolm S. MacLean, "A Conceptual Model for Communications Research," *Journalism Quarterly*, Vol. 34 (1957), pp. 31-33.

Four Experiments

EACH OF THESE studies was an experiment in the sense of having an "independent variable." However, only Experiments 3 and 4 tested a specific "hypothesis." Experiments 1 and 2 had no particular hypotheses; their purpose was just to relate variables one to another. The experiments are described individually here; comparisons between them are made where relevant.

Experiment 1

Experiment 1 involved sources' concepts of accuracy. As noted previously, a "source's concept of accuracy" seems to be more an empirical research procedure than a "concept." The main idea of Experiment 1 was to try to establish what sources might be referring to when they say they have been reported accurately, by looking at correlative *behavioral* conditions in addition to structural ones. The strategy was to *a*) observe signaled stops by news writers, audience members and sources and then *b*) see how these were related to the accuracy, as judged by sources, of news stories and of audience statements derived from those stories. The sources' judgments of accuracy were obtained by asking them questions, as has been done in previous studies. But the results of Experiment 1 pointed to another way of getting at sources' concepts of accuracy.

Related Studies. The "sources" in Experiment 1 were students. Nevertheless, some of the findings of field surveys, which involved "real" news sources' ratings of accuracy, may be of interest. These surveys were concerned mainly with locating conditions conducive to accuracy (or, obversely, the causes of errors) as judged by sources. Some of the sources surveyed were "purposive" in providing information for news-gatherers (e.g., authors of press releases); other sources were not purposive (e.g., newsmakers mentioned in stories who did not actively prepare information

for reporters). Experiment 1 included only purposive sources, but the survey data still are relevant to its design.

Charnley found that stories based on press releases were judged more accurate than stories based on information gathered without press releases.[18] Brown[19] suggested that reporters might initiate more accurate stories by taking better notes, asking sources certain questions about news significance and writing more clearly. Berry[20] found that face-to-face contact between sources and reporters resulted in more accurate stories than telephone contact; and that time pressure on the reporter was associated with errors, although not significantly. Lawrence and Grey[21] asked both sources and reporters about the causes of "subjective" errors; both said lack of background information for the reporter was the main cause. Tichenor, *et al.* found accuracy in science communication to be associated with editor assignment of reporters to stories, stories being based on written reports, and the existence of specific procedures in the source organization for releasing information.[22] Blankenburg found that close acquaintanceship between newsmakers and newspaper staff members was related to greater accuracy and less perceived "seriousness" of errors.[23] Among the common findings of surveys like these has been that about half of the news stories in daily newspapers are free from errors, as far as sources are concerned.

Most of the accuracy-producing conditions dealt with by these studies are structural; they are characteristics of the system within which sources, reporters, editors, etc., do their jobs. Experiment 1 was particularly concerned with relating task *behavior* to accuracy —what do sources, writers or audiences *do* that influences sources' judgments of accuracy? The structural conditions for Experiment 1 included some conditions that would be expected to increase accuracy (stories were based on written material; reporters were

[18] *Op. cit.*

[19] Charles H. Brown, "Majority of Readers Give Papers an A for Accuracy," *Editor & Publisher*, Vol. 98, No. 7 (1965), pp. 13, 63.

[20] Fred C. Berry, Jr., "A Study of Accuracy in Local News Stories in Three Dailies," *Journalism Quarterly*, Vol. 44 (1967), pp. 482-90.

[21] *Op. cit.*

[22] *Op. cit.*

[23] William B. Blankenburg, "News Accuracy: Some Findings on the Meaning of Errors," *Journal of Communication*, Vol. 20 (1970), pp. 357-86.

supposedly assigned by editors) and some conditions conductive to inaccuracy (sources and reporters were not acquainted; reporters were inexperienced).

Observations. Participants in Experiment 1 were 80 pre-major students in an introductory communication theory course at the University of Washington. The course format combined lectures with student participation so that the students applied the concepts of the lectures in "exercises." The experiment was done during a week when the lectures were on mass communication and the concept of news; it was presented to the students as a series of simulation exercises. Each of them would get experience in being a source of news, a reporter and an audience member.

Altogether there were two independent variables: the kind of news involved (political or scientific), and the order of presentation of news stories and audience statements to the sources. The kind of news was varied systematically so as to check for (and, in the case of the reporters, to prevent) gross effects of subject matter. The order of presentation was varied systematically because, as one communication researcher once put it, "Wherever there is sequence, there will be order effects."[24]

The study began with a homework assignment in which the students acted as sources. Each was assigned to make up a one-page list of "facts" that he or she thought the general public should be informed of. At random, half of the students were assigned to be sources of political news, the other half sources of scientific news. They were given special forms for typing the assignment. Short questionnaires were used to check on the task "induction," and on the truth or falsity of the "facts" listed. (The students were not to take any material verbatim from the media, but could improvise on such material. As it turned out, 48 per cent of them composed lists that were mostly true, and 52 percent composed lists that were mostly false.)

The day after the lists were brought in, the students heard a lecture on reporting, then acted as reporters. The lists of facts were given to them such that those who had been political sources got scientific lists, and vice versa. This helped to equalize the degree of experience among reporters. After being alerted that

[24] W. Lee Ruggels, informal communication.

they eventually would be writing news stories on the material, they read it in class. While reading, they showed their interruptions using a variant of the signaled stopping technique: "If and when you come to a place where you want to stop, make a slash mark and note in the margin why you stopped." (To accommodate this, the right margin of the forms was three inches wide.) After the stopping exercise the reporters took the lists with them to write stories, which they brought in the next day. The forms for the reporters' stories were like those for the sources' lists, except for the instructions and the questionnaire items. The reporters saved a line at the top of their stories "for the copy editor to insert a headline." Headlines were constructed by paraphrasing the first paragraphs of the stories.

The next in-class exercise, which was done the day after the stories came in, followed a lecture on readership surveys. The students acted as audience members by reading the stories, which were passed out at random. They were instructed to read the stories as they would any other news items, except to show their interruptions using the signaled stopping technique. After the stopping exercise the students were asked to write down what they thought were the "most important points in the story." These statements were then collected and typed on forms similar to those used for the sources' lists and reporters' stories.

On the final exercise, the students were again "sources." They were told that they would get to see what had been done with their lists of facts. Each source was then given either the audience statement, the news story, or both, based on his or her list of facts. For sources who got both, the order of the two was varied. Thus the presentation of material to the sources involved a 4-group experimental design. The material was arranged so that the sources were assigned at random to the four groups, with the requirement that political and scientific news be equalized within groups (each group was half-and-half) and that message length be equalized between groups (the average length of stories and of audience statements across groups had to be about the same). The sources were asked to show their interruptions while reading the material: "If and when you come to a place where you want to stop, make a slash mark and note in the margin why you stopped."

An "accuracy" question followed each story and each audience

statement. For the stories, there were two open-ended questions ("Considering the way you intended your list of facts to be used, are there any aspects of this story that you like?" and "Are there any aspects of the story that you dislike?"), and then a multiple-choice question, "How accurate was the story?" Following the audience statements was a multiple-choice question, "How well does this person seem to understand the issue or event that you described in your list of facts?"

Results. It was possible to look for relationships not only between the sources' accuracy ratings and structural conditions (kind of news, order of presentation), but also between accuracy ratings and behavior (signaled stops). As for the kind of news, the political/scientific variation was not related to accuracy ratings, either for the news stories or for the audience statements derived from them. Scientific material generally tended to be judged as less accurate, but the differences were not significant.

The accuracy ratings were, however, influenced by the order of presentation to the sources of stories and statements. Further, the behavioral variable of interruptions by sources was associated with both order of presentation and accuracy ratings. In other words, order of presentation affected interruption frequencies, which in turn predicted accuracy ratings. For both the stories and the statements, interruption frequencies and accuracy ratings were negatively correlated: the more a source stopped in either a news story or an audience statement, the lower he or she rated it. The 3-way relationships between order, interruptions and accuracy ratings are shown in Table 1 (for story accuracy) and Table 2 (for statement accuracy), where the cell means are interruption frequencies and the numbers in parentheses are sample sizes. (The total sample size of sources in all of the "order" conditions was 60. Although the experiment began with about 80 students, a few were lost at each of the four stages, of which this was the last.)

The negative relationships between accuracy ratings and interruption frequencies are explicit in the right-hand marginals of Tables 1 and 2. But the order effect is somewhat intricate, since it is represented by the two tables combined. The general order effect shown in Tables 1 and 2 is this: Story accuracy ratings were lowest when the sources read the story first, anticipating an audi-

TABLE 1

Mean Interruptions by Sources in News Stories
(by order of presentation and story accuracy)

Source's Rating of Story	*Order of Presentation*							
	Story Only		Story 1st		Story 2nd		Total	
Accurate	1.4	(9)	2.5	(4)	2.12	(8)	1.9	(21)
Inaccurate	5.0	(7)	4.3	(11)	2.14	(7)	3.9	(25)
Total	3.0	(16)	3.8	(15)	2.1	(15)	3.0	(46)

Analysis of Variance

Source of Variation	*Sum of Squares*	*d.f.*	*Mean Square*	*F*	*p<*
Order of Presentation	20.85	2	10.43	2.22	.15
Story Accuracy	44.53	1	44.53	9.47	.01
Order x Accuracy	197.60	42	4.70		
Total	262.98	45			

TABLE 2

Mean Interruptions by Sources in Audience Statements
(by order of presentation and statement accuracy)

Source's Rating of Statement Accuracy	*Order of Presentation*							
	No Story		Story 2nd		Story 1st		Total	
Good	2.0	(1)	1.0	(5)	0.2	(6)	0.7	(12)
Fair	2.3	(10)	1.4	(5)	0.9	(7)	1.6	(22)
Poor	3.0	(3)	1.8	(5)	0.5	(2)	1.9	(10)
Total	2.4	(14)	1.4	(15)	0.5	(15)	1.4	(44)

Analysis of Variance

Source of Variation	*Sum of Squares*	*d.f.*	*Mean Square*	*F*	*p<*
Order of Presentation	26.1	2	13.05	14.66	.01
Statement Accuracy	10.1	2	5.05	5.67	.01
Order x Accuracy	34.6	39	.89		
Total	70.8	43			

ence statement. Statement accuracy ratings were higher when the sources got to read the stories the statements were derived from, especially when they read the story first. It follows that the stories the sources rated the *least* accurate were associated with the statements they rated the *most* accurate. This anomaly raises the possibility that accuracy ratings were affected by conditions other than message content. (That would seem the simplest explanation of how a statement derived from an inaccurate story could be

judged as accurate.) It appears, then, that "subjective" measures of accuracy were even more subjective than might have been expected.[25]

The sources' accuracy ratings were not predicted by the frequency of interruptions of either writers or audience, only by that of the sources themselves. Signaled stops could perhaps be used as an alternative measure of a source's concept of accuracy. Instead of asking sources whether there are "errors," which is rather intrusive, sources could just be asked to show where and why they stop.

So far the "why" of stopping has not been discussed, only the frequency. Content analysis was necessary to quantify the sources' reasons for stopping. The distribution of the reasons is shown in Table 3. The analysis categories--"to note discrepancy," "note omission" and "comment on style"—were arrived at by collapsing a larger set of categories that was used previously for coding reporters' and audiences' reasons for stopping, together with those of sources. These other categories are described elsewhere.[26]

TABLE 3

Reasons Sources Gave for Interruptions, in News Stories and in Audience Statements

Reason given	*In Stories*	*In Statements*
To note discrepancy	38%	33%
To note omission	34%	33%
To comment on style	25%	16%
Other	3%	....
Total	100%	100%
	(138)	(63)
	N=46	N=44

It had been expected that sources would stop when they perceived discrepancies between what they read and what they had written. But the large proportion of sources' stops to note omissions had not been anticipated, at least not for the stories. (The

[25] But without controls for order of presentation, there was a slight positive correlation between story accuracy and statement accuracy, as has been found in surveys.

[26] Beth Heffner, "Mediated Communication and Subjective Measures of Accuracy," paper presented to Association for Education in Journalism, Columbia, S.C., 1971.

preponderance of "note omission" stops in the audience statements probably is explained simply by their brevity, since the audience wrote down only what were thought to be the "most important points" of the stories.) Sources' complaints of omissions in the stories were looked into by checking their original lists against the stories. (In other words, an observer's concept of message accuracy was invoked.) Surprisingly, more than half of the sources' inquiries turned out to be for material they had not provided in the first place!

Actually, most of the source material that writers were given in Experiment 1 did turn up in their stories in one way or another. There were few direct quotations, but few omissions as well. (This happened also in Experiment 3, where source material again consisted of listed, factual information.) But the matter of omissions *per se* is interesting theoretically, and it might be asked whether omissions are more likely to be made when source material consists of "opinions" rather than "facts." Some data bearing on this question were generated by Experiment 2.

Experiment 2

Another journalistic experiment was conducted by Samuelson as a partial replication of Experiment 1.[27] He followed observational procedures similar to those of Experiment 1, and came up with many of the same results. His data, however, were more suitable for exploring the observer's concept of message accuracy discussed earlier in connection with information theory. If the reporters in Experiment 2 are regarded as "channels," it can be said that there was considerable variation in their "fidelity" and "stability," more so than in Experiment 1. That is, the writers in Experiment 2 varied more both in the proportion of source material included in their stories and in the ways they covered what they did include. This variation turned out to be related to behavioral conditions.

Observations. Like Experiment 1, Experiment 2 involved students creating source material on one topic, writing stories on another topic, and then acting as an audience for the stories. Each time the students read something, they showed their interruptions

[27] Merrill Samuelson, unpublished study, University of Washington School of Communications.

using the signaled stopping technique. Most of the administrative details for Experiment 2 replicated those already described for Experiment 1. But there were these important differences:

1) Instead of the general terms "political" and "scientific" for the topics sources wrote on, the topics were specific. Political sources wrote on relations between the U.S. and Communist China; scientific sources wrote on manned space exploration.

2) Rather than to provide a list of facts, the sources were asked to describe their own "orientation situations" regarding their topics, by identifying their "objects," "attributes," "saliences," and "pertinences." These terms, which were familiar to the students, came from Carter's paradigm for affective relations.[28] The political sources were asked to "tell what relationship the U.S. should have with Communist China;" the scientific sources were asked to "tell whether the next space probes after the Apollo flights should be unmanned." So the source material consisted of opinions, not facts alone.

3) The audience did not receive the news stories at random (see Figure 2). Each person who had written a political story, and who therefore had been a scientific source, was given a scientific story to read—and vice versa. Since the topics were specific, this meant that audience members read stories on the same topics they had been sources for. So results during and after the audience task were not comparable to those of Experiment 1. But the data of interest here in any case concerned only the first two tasks, those of source and writer.

Results. From an observer's point of view, Experiment 2 had more interesting results than Experiment 1, because the writer's treatment of source material varied more. Unlike the stories in Experiment 1, which tended to be edited and rewritten versions of the sources' lists, the stories in Experiment 2 included a significant amount of quotations in addition to edited or rewritten material, and also *excluded* portions of the sources' statements (about one-third of the sources' lines were omitted). So it was possible to use a measure of accuracy focusing on whether, and how, certain units of the sources' statements showed up in the stories.

[28] Richard F. Carter, "Communication and Affective Relations," *Journalism Quarterly*, Vol. 42 (1965), pp. 203-12.

The units looked for first were those that the writers stopped at while reading the sources' statements. A "unit" was either a clause or a word. For a stop at the end of a clause, that clause was the unit, unless a word was mentioned as the reason for stopping. For a stop at a word within a clause, or where a word was given as the reason for stopping, that word was the unit.[29]

Each unit stopped at was looked for in the story, and it was noted whether the unit was directly quoted (all there, within quotation marks); indirectly quoted (all there, not within quotation marks); edited (there in part); rewritten (not there, but replaced by another unit); or left out (neither there nor replaced). The same thing was then done for a sample of clauses not stopped at.

As might have been expected, the variance in what might be called "unit fidelity" was not associated with writers' interruptions *per se*. For example, a unit stopped at was just as likely to be retained in or left out of the story as a unit without a stop. It was found that units stopped at were less likely to be directly quoted than units not stopped at, but that is more or less a matter of common sense, since interruptions more often than not signal some kind of "trouble."

The reasons given by writers for stopping were, however, associated with what they did to the units where they stopped.

For one thing, the writers' treatment of sources' statements was not redundant with value expression (agreeing and disagreeing) on the part of the writers, in that they did not tend to leave out the parts that they stopped to disagree with. Units disagreed with were handled much like units agreed with, and quite differently from material that confused the writers, or that they said was hard to read. These comparisons are obvious in Table 4, which shows what writers did with units they agreed with, disagreed with, expressed confusion over, or found awkward to read.

Just as they did with units they agreed with, writers mostly passed on intact the units they disagreed with, rather than altering the units involved, and certainly rather than omitting them. This result was similar to that of a series of other studies, involving journalism students, in which students disposed against an edi-

[29] This is an example of how signaled stops can be used to locate actors' units, from which other units can then be constructed.

TABLE 4

Writers' Treatment of Source Material, by Reason for Stopping

	Reason for Stopping			
	Agreement	*Disagreement*	*Confusion*	*Reading Difficulty*[a]
What Writer Did:				
Directly or Indirectly quoted	57%	61%	15%	2%
Edited or rewrote	24%	32%	15%	19%
Left out	18%	7%	69%	79%
Total	100%	100%	100%	100%
	(33)	(28)	(26)	(41)

[a] Many of these units were words, while the units for the other categories were mostly clauses.

torial policy tended to write editorials slanted in favor of the policy.[30]

Among units stopped at, the most common reason associated with omission of a unit was poor readability, with unintelligibility a close second. In short, accuracy seemed to be associated more with the source material being clear to the writers than with its being supportive of their values. This set of results seems consistent with those of the previous surveys discussed with reference to Experiment 1, in which a different kind of accuracy was measured. In those surveys, sources' ratings of accuracy generally were found to depend on system characteristics that would maximize the clarity of source material for writers.

Another set of comparisons with implications for message accuracy is presented in Table 5, which shows how writers handled units where they stopped to ask questions. Their treatment of these units varied according to whether the questions were to ask for specific information pertaining to a unit ("location or relation"), ask about the veracity of a unit ("incredulity"), or ask for general amplification of a unit ("confusion").

According to the results in Table 5, lack of completeness of a unit ("location or relation" questions) was not associated with leaving it out. Again, lack of clarity ("confusion" questions) was so associated. For the questions concerning credibility, the tend-

[30] Jean S. Kerrick, Thomas E. Anderson and Luita B. Swales, "Balance and the Writer's Attitude in News Stories and Editorials," *Journalism Quarterly*, Vol. 41 (1964), pp. 207-15.

TABLE 5

Writers' Treatment of Units Questioned, by Kind of Question

	Kind of Question:		
What Writer Did:	*Location or Relation*	*Incredulity*	*Confusion*
Directly or indirectly quoted	61%	32%	15%
Edited or rewrote	26%	25%	15%
Left out	13%	43%	69%
Total	100% (39)	100% (37)	100% (26)

ency was to either leave the unit intact or omit it, and not to change it particularly not by editing.

In Experiment 2 the ultimate instance of message accuracy was the direct quotation. A serendipitous result concerning direct quotations, was that there were significantly more of them in the political stories (on China policy) than in the scientific stories (on space research). A hypothesis derived from this result was tested in Experiment 4, to be described below.

The concept of accuracy measured in Experiment 2 was based on comparisons of message content. But for communication involving human participants, such a concept may not be sufficient. Suppose that a receiver of a message is able to repeat the message verbatim. This situation would be characterized by accuracy in the sense observed in Experiment 2. But persons are more than machines, and even though they may be able to reproduce messages, they may not "understand" them. The other side of the coin is that messages often can be significantly changed in transit and still be "understood."[31] For example, free translations, which are less accurate (in the sense of Experiment 2) than literal translations, often are easier to "understand." So it seems that preservation of message content is neither necessary nor sufficient for understanding. Maybe another concept of accuracy, taking understanding into account, would be more useful for human communication. This idea led to Experiment 3.

[31] For essentially the same point in different terminology, see Klaus Krippendorff, "On Generating Data in Communication Research," *Journal of Communication*, Vol. 20 (1970), p. 264.

Experiment 3

In popular usage, accuracy in communication often is described as a condition in which the receiver of a message "gets the point," or "understands what the source means." Just what do such descriptions refer to? This is an important question because of its implications for the boundaries of human communication, i.e., what can or cannot be communicated. Like other concepts of accuracy, the popular concept seems to imply some kind of preservation. But it seems clear that what is preserved need not be message content.

Much of what has been written on communication describes this kind of accuracy in terms of similarity—similarity of either "cognitions," "referents" or "meanings" between two persons. But for purposes of observation, none of these will do. Cognitions can be ruled out immediately, since they are undefined primitive terms. Referents would not even be *relevant* to observe because, as Ayer has pointed out, "The criteria for deciding whether two people understand each other are logically independent of the fact that the same objects are perceived by both."[32] There remains the notion of similar meanings. Because there are so many different concepts of meaning, a review will not be attempted here. But in a review elsewhere,[33] it is shown that observation of meanings, at least as they have previously been defined, would lead to these difficulties:

1) *Emphasis on inaccuracy rather than accuracy.* Concepts of meaning usually are based on learning theories that describe how meanings are acquired. They focus on the history of the unique individual, hence are more useful for explaining "individual differences" than for explaining similarities between individuals. Although public aspects of meanings occasionally are mentioned, as by Carroll,[34] this is done only to state assumptions about the use of language.

2) *Emphasis on the receiver.* Accuracy described as "similar meanings" implies two different roles with respect to meanings. The prob-

[32] A. J. Ayer, "Can There Be a Private Language?" In George Pitcher (ed.), *Wittgenstein: The Philosophical Investigations* (New York: Doubleday, 1966), pp. 251-6.

[33] Beth Heffner, "The Possibility of Communicative Accuracy," unpublished dissertation, University of Washington, 1971.

[34] John B. Carroll, "Words, Meanings, and Concepts," *Harvard Educational Review*, Vol. 34 (1964), pp. 178-202.

lem here is not that the focus is on the individual person, but that only one of these roles is accounted for. Theories of meaning tend to explain how a message evokes a meaning, but not how a meaning evokes a message. They can show how either a source or a receiver can respond to a message *after* it is produced, but not how the source came to produce it.

3) *Small units.* As mentioned previously, meanings usually are conceived of as being "learned;" i.e., accounted for by theories of learning. Because learning theories have to specify what is acquired, they have to deal with things that *can* be acquired, so they cannot be applied to units much larger than words. But behavioral linguists have pointed out that persons often say or react to larger units that they have never said or heard before—that they thus could not have "learned."[35] Where communication involves units larger than words, where there is no minimal "repertoire" from which to choose, concepts of meaning based on learning theories just do not apply.

In short, "content" constructs such as cognitions, referents and meanings do not promise much for observation of the conditions under which it may be said that one person understands what an other person means. But how about a content-free definition of accuracy, a "form" construct? Both the source and receiver of a message have to *organize* data; and maybe accuracy could be viewed as their having similar patterns. As the gestalt phychologists have suggested, all of reality can be regarded as configurational, as depending on patterns rather than parts.[36]

The notion of units is useful here. Accuracy in the sense of "understanding" between the source and receiver of a verbal message might be regarded as the extent to which they have the same number of units for the message, with corresponding beginning and end points for each unit. Such a definition places the responsibility for accuracy about equally on both participants, which is where it would seem to belong. Two kinds of inaccuracy would be possible. Either the receiver could have a unit where the source had none, or vice versa.

Now it might be argued that even if the persons did have the same unit boundaries, they might still have different "meanings"

[35] E.g., Noam Chomsky, *Aspects of the Theory of Syntax* (Cambridge, Mass.: M.I.T. Press, 1965).

[36] E.g., Kurt Koffka, *Principles of Gestalt Psychology* (London: Routledge, 1955).

within the units. For example, people often seem to project their own ideas onto what is said to them, even though they may structure what is said the same way as the source does. How could something like this be viewed as an achievement of understanding? The answer to this objection would be that if the "meanings" really are significantly different, then the pattern of units could not remain preserved for very long. Eventually one of the persons would either interrupt in the middle of one of the other person's units, or would be expecting more where the other person had completed a unit. The proposed definition is not incompatible with notions of "meaning;" it simply is independent of them, for reasons given above.

Another objection might be that the message may not be related to what is "really" being communicated, e.g., often the "real" message is simply that the participants are speaking to each other. Further, a lot of communication seems to be either gratuitous or ritualistic. How can accuracy be defined in terms of how persons organize a message when the message may not matter? In a way, this objection enhances rather than detracts from the proposed definition, since both minimize the importance of message content. The answer here would be that wherever it makes any sense to talk about accuracy (in the sense of understanding), it can be regarded as preservation of patterns of units. The message is the only link between the participants, and if it is not related in one way or another to what the source has to say, or if the source has nothing to say, then questions about accuracy cannot be asked.

For verbal communication, in which message units are "strung out" over time, observing this kind of accuracy would require finding out whether a receiver's temporal units are synchronous with the source's temporal units. If both participants could point out when they begin and complete units, accuracy could be observed by comparing their respective beginning and end points. Such a signaling technique was used in Experiment 3.

Observations. If the above definition of accuracy is used, persons should communicate more accurately, i.e., form units more synchronously, when they use the same basis for forming units, than when they do not use the same basis for forming units. A journalistic experiment was designed to test this: The independent

variable was the degree of similarity of the participants' basis for forming units; the dependent variable was the degree to which their units were synchronous.

The experiment involved student respondents in a setting similar to that of Experiments 1 and 2, but it was less complicated because there were only two tasks involved: writing, and planning illustrations for, an environmental feature story. In one set of conditions, the writer and illustrator of a story were instructed to organize the story around the same dimensions; in another set they were instructed to organize the story around different dimensions.

On the first day of the experiment, in which the students acted as writers, each was given a 4-page pamphlet: 1) instructions, in the form of an editor's assignment to do a particular feature story; 2) a list of facts to be included in the story; 3) a form for typing the story; and 4) carbon paper and a form for a copy of the story.

The first of these, "editor's assignment to writer," was used in creating the independent variable: Half of the students were told, in effect, to organize their stories around what may be called *process* dimensions. That is, their assignments included such instructions as "Your story should be just that—a story. It should show the unfolding of events involving . . . (X, Y, and Z) . . . , to clarify how one thing led to another." The other half of the students were in effect told to organize their stories around *structure* dimensions. Their assignments included such instructions as, "Your story should make clear to the reader the differences between . . . (X, Y, and Z). It should show how to identify each." So, although the directions differed as to how units were to be formed, they were the same as to story content—each student was told to include all the facts in his or her story.

The second page in the students' pamphlets, the list of "facts for the story," was on one of two ecological topics, cleaning agents or insecticides. The reason for this variation was to allow the students to have different topics as illustrators from what they had as writers. The list for each topic included both process-oriented facts ("historical notes") and structure-oriented facts ("characteristics of . . ."). The variation in topic was combined with the variation in instructions, such that for each topic, half of the students had process instructions and half had structure instructions.

On the third page, the form on which the students typed their stories, they were asked not to show paragraph divisions, so that each sentence was placed immediately after the preceding one. Then, on the fourth page, which was the carbon copy of the story, the students were told to "Go through this copy of your story, making a slash mark (/) each time you come to a place where a diagram, photograph, drawing or cartoon could be used to illustrate one of your points." (This was used later, in creating the dependent variable.)

The reporter's instructions were given orally as well as in writing. Before the assignments were passed out, the instructor talked for a few minutes about environmental news, and about how the simulation exercise would be applied to the course material. After the assignments were passed out, the instructor briefly went over each page. In connection with the fourth page, to further clarify what an "illustration" could be, slides were projected showing examples of diagrams, photographs, cartoons and drawings.

Three days later, the other part of the experiment was done in class, with the students assuming they were in charge of illustrating the stories. The instructor told them that, "In science articles particularly, it's important to have illustrations that show the major points, because people usually look at them even if they don't read the story itself." The students were each given someone's story to read, with the instructor explaining that they would have different topics from the ones they had written on.

Preceding each story was an "editor's assignment to illustrator," which in effect told the student to form units either on a process basis ("This story is supposed to explain to the reader the series of events that led up to the present crisis . . ." or on a structure basis ("This story is supposed to describe to the reader the differences between . . ."). The instruction to the illustrator was, "I'd like you to read through the story. Each time you come to a place where you think one of the points of the story could be illustrated (with a diagram, photograph, drawing or cartoon), make a slash mark (/)."

The material was arranged so that those students who had written on cleaning agents got to plan illustrations for a story on insecticides, and vice versa. Within this arrangement, the stories

were distributed such that half of them were assigned to illustrators whose directions regarding unit formation were the same as those of the writers; the other half being assigned to illustrators whose directions were different from those of the writers.

Results. The dependent variable, accuracy, was observed by "scoring" each story according to how its writer and illustrator broke it up into units. For each story, the numbers and locations of the reporter's and illustrator's unit indicators (slash marks showing all possible places for illustrations) were noted. The score for each story consisted of the ratio of the number of unit indicators that the reporter and illustrator had in common, to the average number of unit indicators between them, i.e.,

$$\text{score} = \frac{\text{number in common}}{\text{total number}/2}$$

In both replications, accuracy scores were higher for dyads who used the same basis for forming units than they were for dyads who used different bases. That is, where the writer and illustrator both had either "process" or "structure" instructions, accuracy scores were higher; and where one of them had "process" instructions and the other had "structure" instructions, accuracy scores were lower. Table 6 shows the mean accuracy scores in each replication for the two values of the independent variable. For the first block (stories on cleaning agents), the difference between the two means was significant at the .005 level; for the stories on insecticides the difference between the means was not significant $p < .15$.

TABLE 6

Mean Accuracy Scores for Dyads with Similar and Different Bases for Forming Units

	Bases for Forming Units: Similar		Different
Replication:			
"Cleaning Agents"	.516 (n=19)	***	.347 (n=19)
"Insecticides"	.455 (n=20)	*	.392 (n=22)

*** $p < .005$
* $p. < 15$

TABLE 7

Mean No. of Common Unit Markings Made by Dyads with Similar and Different Bases for Forming Units

	Similar		Different
Replication:			
"Cleaning Agents"	5.03	***	2.89
"Insecticides"	4.51	**	3.04

*** $p<.005$
** $p<.01$

It would not have been correct to combine the data in the two replications to get larger sample sizes and higher significance levels, because students who were writers in one replication were illustrators in the other. Predictably, they were correlated with themselves as to the numbers of units formed. The correlation between the number of units a student had as a writer and the number of units he or she had as an illustrator was .59. However, even as this high correlation precluded combining the data for purposes of looking at accuracy scores, it provided a measure of reliability between replications as to unit formation.

The effect of the independent variable was more striking when only the numerators of the accuracy scores were considered, i.e., only the number of unit markers in common between writer and illustrator. Table 7 shows the mean numbers of unit markers the dyads had in common, for each value of the independent variable, and in each replication. The differences between the means of these "simplified" accuracy scores were at the .005 and .01 significance levels, respectively, for the two replications.

To summarize, Experiment 3 was concerned with message organization as a content-free characteristic of communication behavior. It showed that organization can affect accuracy in the sense of understanding, i.e., that accuracy can be looked for independently of message content. This concept requires an observer's point of view because it depends on factors other than message content.

Experiment 4

Experiment 4, which combined features of the other three, was designed to check on effects not controlled for in those studies,

and to try to answer some questions they raised. The purpose was twofold:

1) To eliminate carry-over effects of tasks by having each task done by a different group of students. The writers in Experiment 4 were not former sources, and the sources and audience were not former writers. In particular, the concept of accuracy observed previously in Experiment 1 (source's concept) was measured again in Experiment 4 with sources not contaminated in other writing tasks.

2) To find out whether one of the unexpected results of Experiment 2 (writers using more direct quotations with one of the topics written about than with the other) could have been due to different organizational bases implicit in the two topics. One of several differences between the two topics written about in Experiment 2 was that while one topic seemed to generate source material with a "process" mode of organization, the other topic resulted in "structure"-oriented material. Stories written from "process" statements had significantly more quotations. In Experiment 4, the organizational basis was varied by itself, with other aspects of the topics written about held constant. It was expected that the process basis for organization would lead to more direct quotations (message accuracy) than the structural basis.

Observations. Experiment 4 resembled Experiment 1 in the ordering of journalistic tasks; it was like Experiment 2 in the kind of topic written on; and it had the same independent variable as Experiment 3.

On the first day of the experiment, students were assigned at random to one of two tasks. One of these required no writing; the student simply answered an opinion question concerning primary elections, and then diagrammed his or her "orientation situation" (objects, attributes, etc.) for that opinion.

The other task was to provide source material for a story. There were two versions of this assignment, constituting an independent variable like that of Experiment 3. One version, the *process* condition, required the student to "tell whether you believe that manned space exploration by the U.S. after the Apollo flights should be *"discontinued* or *continued;"* and then to "describe your orientation situation, i.e., the likely consequences (attributes)

that you see in continuing and discontinuing (the relevant objects) manned space flights." It was expected that students in this condition would tend to make action-oriented statements, of the form "X will bring on Y." In the other version of the assignment, the *structure* condition, the student was required to "tell whether you believe that space exploration by the U.S. after the Apollo series should include *only unmanned* flights or *some manned* flights" and then to "describe your orientation situation, i.e., the characteristics (attributes) that you see in manned and unmanned space flights (the relevant objects)." Students in this condition were expected not to make so many action-oriented statements, and therefore not to be as quotable, as students in the process condition. The hypothesis was that sources in the process condition would be quoted more by their writers than sources in the structure condition.

In the next stage of the experiment, which was a few days later, the students again did one of the two tasks. Those who had been sources in the preceding stage (about one-third of the students) did a non-writing assignment in which they ranked statements according to their "news values." Half of the remaining students were assigned at random to write stories based on the sources' statements; while the other students got the assignment on news values.

The writers' stories were photocopied twice, so that each student would get to read a story in the final stage of the experiment. Each story then was read by three kinds of audience member: 1) a student who had not acted as either a source or a writer, 2) a student who had written a story on the same topic, and 3) the source for the story. Thus it was possible to check for carry-over effects of tasks within Experiment 4, in addition to comparing it with the other experiments.

Results. It was suggested earlier, in discussing the results of Experiment I, that sources' concepts of accuracy might be measured through sources' signaled stopping instead of asking them explicitly to look for errors. In that experiment, sources seemed to stop primarily when they saw something "wrong," and their interruption frequencies were negatively correlated with their accuracy ratings. So in Experiment 4 it was decided to try to measure sources' concepts of accuracy through interruption fre-

quencies alone. Questionnaire ratings of accuracy were not used in Experiment 4.

Unfortunately, dropping the questionnaire items turned out to be a mistake. It would not have been correct just to assume that the sources would react as they had in Experiment 1, because of an important difference in procedure. In Experiment 1 the sources had acted as writers themselves before reading the stories derived from their source material. This previous experience might have sensitized them to be either more or less critical than they would have been otherwise. So it was necessary first to compare sources' interruptions for the two experiments, before using the Experiment 4 interruptions as a measure of accuracy.

Stopping in stories by the sources of Experiment 4, who had not written stories themselves, did differ both in frequency and in content from that of the sources in Experiment 1. This difference in interruption frequencies may be seen in Table 8, which gives median stops-per-line measures for all tasks in Experiments 1, 2 and 4. (Experiment 3 is not included because it involved another signaling technique.)

For sources, the median interruption frequency was .25 stops per line in Experiment 4, compared with only .14 stops per line in Experiment 1. Because interruption frequencies in the other tasks were similar across experiments, this difference would not seem to be an artifact of the different groups of students involved. Rather, the difference seemed to be that, while the sources in

TABLE 8

Median Interruption Frequencies (Stops per Line), by Experiment and Task

	Experiment		
	E1	E2	E4
Task			
Writer	.53*	.26	.24
Audience	.25	.26	.22
Source W	.14	....	.25
Source A	.25	....	....

* In this condition, source material was listed rather than being in prose format. The higher stopping frequency for a list has been observed in other studies of stopping.

TABLE 9

Reasons Sources Gave for Interruptions in News Stories in Experiment 4, Compared with Experiment 1

Reason:	Experiment 4	Experiment 1
Note discrepancy	18%	38%
Note omission	14%	34%
Comment on style (positive or negative)	24%	25%
Pause to think	13%	....
Recognize own name	13%	....
Acknowledge accuracy	9%	....
Other	8%	3%
	100%	100%
	(121)	(138)
	N=26	N=46

Experiment 1 stopped *only* to point out "errors," those in Experiment 4 stopped both to point out errors and to point out "good" things. The latter's frequency of stopping to criticize was about the same as the total frequency in Experiment 1. Reasons given by sources for stopping in the two experiments are summarized in Table 9.

In Experiment 4, reasons sources gave for stopping *other* than to point out errors were *a*) to think, *b*) to react to seeing their names in print, and *c*) to say that something was presented accurately. Since the sources' names appeared much more often in the stories of Experiment 4 than in those of Experiment 1 (writers had been asked to identify the sources in E_4), the basis for the difference between the two experiments in stops to react to names is obvious. But maybe this difference had additional effects, i.e., stopping at one's name, which came at the beginning of the story, could have affected a source's subsequent stopping. The stops to think and the stops to acknowledge accuracy that occurred in Experiment 4 may have been related to the sources' having their names in (and thereby associated with) the stories. In short, there are two likely reasons for the difference in sources' stopping patterns in Experiments 1 and 4: differential previous experience as writers, and differential identification in the story.

Fortunately, the above results did not bear on the hypothesis of interest in Experiment 4, which concerned not sources' notions of

TABLE 10

Length of Source Material, Story Length, and Amount of Material Quoted, by Basis for Organization

	"Process" Stories		"Structure" Stories
Mean Length of Source Material	24.6		26.9
Mean Story Length	20.8		21.6
Mean No. of Lines Quoted	4.4	$p<.5$*	2.1

* $F=5.8$

accuracy but an observer's concept of message accuracy. It was expected that stories written from "process" source material, which took account of time and thus included action statements, would have more quotations than stories written from "structure" source material, which did not include time as a basis for organization. This expectation was based on the different kinds of "pictures" represented in the two kinds of source material. Just as it is more likely that a television camera will record action than static events, so should it be more likely for writers to reproduce action statements than static ones. (This is not to suggest that human writers are "no more than" recording instruments; it is just that the concept of accuracy being used here considers only the extent to which the writers could be regarded as such.)

It happened that the writers in the process condition did quote significantly more than did those in the structure condition. Although both source material and stories in the two conditions were of comparable length, the average number of lines quoted in the process stories was more than twice that for the structure stories. Table 10 gives the mean numbers of lines in source material, stories and quotations for the two conditions.

Even though both source material and stories in the process condition were a little shorter on the average than those in the structure condition, the mean number of lines quoted in the process stories was 4.4, compared with only 2.1 in the structure stories. The extended implication for sources would seem to be that if they want to be quoted, they should make statements that include a time line. For example, statements of the form "If A is done, than B will happen" would be more quotable than statements of the form "A is (or has) B." The former represent action pictures while the latter do not.

Conclusions

In these journalistic experiments, signaling techniques were used by participants such that three different kinds of accuracy could be measured: a source-oriented concept (Experiments 1 and 4); an observer's concept of message accuracy (Experiments 2 and 4); and an observer's concept of "meaning" accuracy (Experiment 3). The first of these was observed through signaled stopping on the part of sources, in reading stories derived from statements they had written. The second was observed by comparing message units in sources' statements with those in stories based on the statements, where "units" were determined from signaled stops. The third concept was observed by comparing unit boundaries signaled by writers and illustrators of stories. Following are some reflections on the potential of these three operational concepts of accuracy for further investigation of communication, journalistic or otherwise.

Source-oriented concept. As has been observed in other studies, sources in these experiments were not consistent in pointing out either erroneous representations or accurate ones. Their judgments of accuracy seemed to be affected by factors such as the order in which messages were presented to them, and whether or not their names appeared in stories. Also, they sometimes said material was omitted that they had not provided to begin with, while not inquiring after parts that were in fact omitted. In short, the source-oriented concept of accuracy seems to involve not just accuracy but a lot of other things. And there seems to be little a source can say about accuracy that an outside observer could not get at independently anyway. Maybe "accuracy as judged by sources" should be replaced by something like "source satisfaction," which is what the sources here really seemed to be referring to.

Observer's concept of message accuracy—This concept was much like that of information theory, but not quite. The difference was that the message units compared in these experiments were

not arbitrary but were specified by respondents, either through signaled stops or quotation marks. There were some clear-cut results associated with this concept, most of which were not surprising. For example, message accuracy was found to be minimal for units that reporters pointed out as merely confusing them, and maximal for units they expressed agreement or disagreement with. One non-obvious result, however, was that accuracy was higher for "process" units (those representing sequence in time) than for "structure" units (those without a time line).

But message accuracy clearly is not the same thing as "meaning" accuracy, which seems to be a better criterion for human communication. Maybe the former is worth looking at only insofar as it can be expected to affect the latter.

Observer's concept of "meaning" accuracy (understanding). This may be the most difficult to talk about of the three concepts being considered here. Yet it seems to have more substance than the source-oriented concept, and more pertinence to important communication problems than the observer's concept of message accuracy. One direction in which to proceed might be to invent a more precise signaling technique for operationalizing this concept. Although it may be reasonable to regard understanding independently of message content—as a matter of organizing, patterning or maintaining relationships among units—there is more to be observed than unit boundaries, which are all the present technique shows. A theory of units, of "picture organization," also seems called for.

One concept of accuracy not explored in these experiments was that of a receiver. The reason was that further work seemed necessary to clarify such a concept. The two attempts to do so discussed earlier both depended on message content: Communication is accurate for a receiver—he thinks he "understands"—to the extent that the present message is consistent with earlier message content. But message content may not be the crucial factor. For example, the notion of convergent series in mathematics often seems "clear" to persons the first time it is presented to them, even though the message content is completely new. Then, after they have thought a while about convergent series, the only thing that is clear is that they don't understand it, and the more one thinks about it the less clear it becomes. Maybe what makes people say

they "understand" is that they think they recognize some pattern. The pattern is what was "already there," so to speak, rather than previous message content. This would account for how people could say "I understand" to novel message content, and it would also account for how they could understand less after further thinking. That is, they realize that the pattern they "recognized" wasn't right after all. What a person refers to when saying "I understand," then, could be that he *has* some picture—not that he recognizes this picture from earlier ones. At any rate, this seems to be one direction that a receiver-oriented concept of accuracy might take.

All of the experiments discussed here were set up to "trace" what occurs when information passes through persons, by looking for links between the persons' internal communication behavior, which they signaled, and their external communication behavior (messages). The results suggest that the concepts of accuracy most promising for journalism are those that are the hardest to formulate, i.e., the observer's and receiver's concepts of understanding. The other accuracy concepts, that of a source's judgment and that derived from information theory, incline toward either the obvious or the irrelevant; yet they are the ones that have received by far the most attention.